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Numerical simulations of the Plasma Couette Flow Experiment
F. EBRAHIMI, C.B. FOREST, I.V. KHALZOV, D.D. SCHNACK, Center for Magnetic-Self Organization in Laboratory and Astrophysical Plasmas, University of Wisconsin-Madison — We have performed numerical simulations of the Plasma Couette Flow Experiment using the extended MHD code NIMROD (nimrodteam.org). The plasma Couette flow experiment has recently been constructed at UW-Madison to study magnetorotational instability (MRI) in a hot, unmagnetized and fast flowing plasma. Plasma is confined by strong multipole magnetic field at the plasma surface, and it rotates through the generated toroidal ExB flow at the boundaries. The goals of the experiment are to study MRI and possible self-generation of the magnetic field by MRI-driven turbulence at high magnetic Reynolds numbers. As proof of principle we first numerically obtain an experimentally relevant flow, a Taylor-Couette flow generated by tangential electric field using the boundary condition ExB. Stability and the dynamo action in this configuration will be discussed. We also study the possibility of self-generation of magnetic field through hydrodynamic turbulence generated by counter-rotating von Karman flows. This work is supported by NSF.

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